

### REMARKS

Upon entry of this amendment, claims 1-9, 11-14 will be all the claims pending in this application. Applicants amend claims 1-7, 11 and 13. Claims 10 and 15-28 are cancelled. Support for the amendments to claims 1-7, 11 and 13 can be found, *inter alia*, in the specification at pages 12-13. Applicants also amend the specification and abstract in accordance with the Examiner's suggestions.

Entry is respectfully requested.

### Election/Restrictions

On May 12, 2009, Applicants provisionally elected to prosecute Group I, claims 1-15, without traverse. Applicants affirm this election.

### Priority

The Examiner states that this Application appears to claim subject matter disclosed in prior Application No. PCT/JP05/02089, filed Feb. 4, 2005, and that a reference to the prior application must be inserted as the first sentence of the specification, or in an application data sheet.

Applicants note that the present application is simply the national stage of the PCT application, as shown in the Declaration filed with the application, and recognized by the Office as shown by the filing receipt. Although it is not necessary to state at the beginning of the application that the present application is a national stage of PCT/JP05/02089 (see MPEP 1893.039(c)III, particularly the second sentence bridging the left and right columns on page 1800-199 of Rev. 7, July 2008), Applicants include herein an amendment to the first sentence of the specification to resolve this issue.

**Oath/Declaration**

The Examiner states that the Oath/ Declaration was not executed in accordance with either 37 CFR § 1.66 or 1.68.

Applicants submit that all four inventors executed a Declaration on July 3, 2006, which was filed with the application in the US Patent Office, sa can be seen in the PAIR system on the PTO website.

**Objections to the Specification**

A. The Examiner objects to the Abstract for not including a chemical equation illustrating the inventive concept.

B. The Examiner believes that the specification has several grammatical errors, is unclear, and lacks idiomatic language throughout. The specification should thus be revised carefully in order to comply with 35 U.S.C. § 112, first paragraph.

C. The Examiner suggests that Applicants follow the preferred layout for a utility application, i.e., to amend the specification to include the sections shown on page 7 of the Office Action.

Applicants amend the specification to improve the idiomaticity thereof and to include sections consistent with the Examiner's suggestions.

Applicants amend the Abstract to include a chemical equation.

In view of the foregoing, it is respectfully requested that the objections to the specification and abstract be withdrawn.

**Claim Objections**

Claim 11 is objected to for failing to further limit the subject matter of claim 2.

The Examiner believes that claim 11 depends from claim 2 and contains aryl moieties in a Markush group; however, claim 2 is drawn to alkoxy containing alcohols, which are alkanols, and as such, do not include aryl compounds. Hence, according to the Examiner, claim 11 is broader than claim 2.

Applicants respectfully traverse.

Claim 2 recites “A method for producing 3-alkoxy-1-propanol, which comprises reacting an allyl alcohol with an *alcohol compound*...”

Claim 11 limits the *alcohol compound* of claim 2 to at least one of those selected from the group consisting of methanol, ethanol, n-propanol, isopropanol, n-butanol, isobutanol, t-butanol, and allyl alcohol.

Specific support for the claims is included in the specification bridging pages 18 and 19.

In view of the foregoing, claim 11 does not fail to further limit the subject matter of claim 2, and the objection should be withdrawn.

#### **Rejections Under 35 U.S.C. § 112**

A. Claims 1-3, 7-9, and 13 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The Examiner does not believe that Applicants possess the claimed use of actinoid species as a catalyst, since Applicants do not disclose any embodiments or data involving even one actinoid species. The Examiner essentially takes the position that, besides offering the lanthanide series catalyst in the examples, Applicants offer nothing else to demonstrate that the reaction proceeds with actinide catalysts.

According to the Examiner, a reaction might occur between an allyl alcohol and an alcohol, but it is only speculative as to whether a 3-alkoxyl-propanol species would be formed when substituting an actinide catalyst for a lanthanide catalyst.

B. Claim 10 is rejected under 35 U.S.C. § 112, first paragraph, because the Examiner believes that the specification, while being enabling for condensed phase reactions (perhaps even solution-surface interfacial reactions), does not reasonably provide enablement for gas phase reactivities.

The Examiner also states that claim 10 covers all reactions between allyl alcohols and alcohols in the presence of a catalyst.

Essentially, the Examiner takes the position that there is no guidance or working examples provided for the claimed gas phase reactions other than what is mentioned in the specification at p. 7 (which is a copy of the instant claim) and p. 19 (which, according to the Examiner, includes no details therein).

The Examiner takes the position that one would not be able to practice the invention without numerous experimental trials and working out all the conditions for the gas phase synthesis, which is assertedly atypical in organic chemistry where wet synthetic methods are the norm.

C. Claims 1-7, 13, and 14 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite because the term "group III" does not identify adequately the subject matter subject to limitation.

Applicants amend the claims as follows to comply with 35 U.S.C. § 112.

As to item A, claims 1-3, 7-9, and 13 have been amended to delete reference to "actinoid elements."

As to item B, Applicants cancel claim 10.

As to item C, Applicants have amended the recitation in claims 1-7, 13, and 14 of “group III, lanthanoid elements and actinoid elements” to instead recite “scandium, yttrium and lanthanoid...” based on the disclosure at pages 12-13.

Withdrawal of the rejections are earnestly solicited.

**The Claims are Patentable under 35 U.S.C. § 102**

Claim 15 is rejected under 35 U.S.C. § 102(b) as being anticipated by Yamakawa et al., 2 Catal. Comm., 191-94 (2001). The Examiner states that Yamakawa discloses 3-methoxy-1-propanol at p. 191.

Applicants cancel claim 15. This rejection is moot.

Withdrawal of the rejection is respectfully requested.

**The Claims are Patentable under 35 U.S.C. § 103**

A. Claims 2-14 rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamakawa, and further in view of US Patent Application No. 10/720,686 (pub. Jul. 29, 2004 as US 2004/0147756) to Miyata et al.

Yamakawa is cited as teaching the production of 3-methoxy-1-propanol from the reaction of allyl alcohol with methanol at pp. 191-92. (See Yamakawa, equation, p. 191, Experimental section, and Table 1.) The catalysts used are MgO (where reaction is also reported as being in the presence of water), ZrO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, and HY, having a large range of surface areas ( $S_{BET} = 92.5 - 719 \text{ m}^2/\text{g}$ ). The reaction is performed at 500 K, which is sufficient temperature so that appreciable amounts of vapors would be available for reaction.

Miyata is cited as disclosing the production of oxygenated and hydroxygenated organic species using a large number of catalysts that include oxide and alkoxide species, as well as

supported catalysts. The metal catalyst is not particularly limited, and a support of carbon, alumina, and calcium sulfate is included.

The reason for the rejection is that one skilled in organic chemistry would recognize that, while Yamakawa does not teach the group III, lanthanide, or actinide oxides or alkoxides, the catalyst identity is not that particular for the alkoxy alcohol transformation. According to the Examiner, the more important factor governing the reaction is the presence of water, where certain Lewis acids would be less effective. In this environment, according to the Examiner, utilizing group III, lanthanide, or actinide oxides or alkoxides is advantageous. The Examiner further notes that the application of rare earth catalysts, e.g.,  $\text{Sc}(\text{OTf})_3$ ,  $\text{Ce}(\text{OTf})_3$ ,  $\text{Lu}(\text{OTf})_3$ ,  $\text{Sm}(\text{OTf})_3$ , and  $\text{La}(\text{OTf})_3$  was recognized by Berkessel in reactions that produce alcohols and alkoxy alcohols (See Berkessel et al., 254 Appl. Catal. A, 2734 (2003)). Additionally, Kobayashi is cited for disclosing the benefits of using Lewis acid catalysts in organic synthesis in the presence of water. (See Tables and equations throughout Kobayashi et al., 72 Pure Appl. Chem., 1373-80 (2000)).

The Examiner also takes the position that the surface areas appearing in claim 9 are mere optimizations of that taught by Miyata, and, given similar conditions, an organic chemist expects like reactions to occur within similar fields. Likewise, the Examiner believes that claims 13 and 14 fail to further limit the process of claim 2, and are mere optimizations, and would thus have been obvious to one skilled in the art.

B. Claim 1 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamakawa and Miyata as applied to claims 2-15 above, and further in view of US Patent Application No. 10/814,859 (pub. Oct. 6, 2005) to Chaudhari et al.

Claim 1 is directed to production of 1,3-propandiol via the hydrolysis of the product from the process of claim 2. Chaudhari is further cited as teaching the production of 1,3-propanediol via hydrolysis of 3-carboxy propanol. The Examiner takes the position that, although the precursors to the diol are not identical, the use of analogous reactants in a known process is *prima facie* obvious insofar as an artisan would be motivated to utilize the process to arrive at the instant claimed process with the expectation of producing the diol.

Applicants respectfully traverse.

Both obviousness rejections rely on the Examiner's improper application of Yamakawa and Miyata to the pending claims. The rejection of claim 1 further relies on the Examiner's improper application of Chaudhari et al.

Specifically, the catalyst used in the present invention is quite different from the catalyst used by Yamakawa. Indeed, Yamakawa discloses the addition of methanol to allyl alcohol, which is the same reaction as that of the present invention. However, Yamakawa uses elements of Group II of the Periodic Table as a catalyst. In contrast, the present invention uses a catalyst containing an element of Group III of the Periodic Table, i.e. scandium, yttrium, or a lanthanoid element. Please see the attached Appendix for the reaction scheme for Yamakawa.

The present invention also exhibits unexpected superiority. Comparative examples 1 to 3 of the present application use a magnesium (a Group II element) oxide catalyst, which is a catalyst also disclosed by Yamakawa. The activity per mole of metal element of Group III element, as claimed, is more than 10 times higher than that of Group II elements.

The Examiner assumes that it would be obvious to divert the catalyst disclosed by Berkesse or Miyata to the reaction disclosed by Yamakawa. However, the reactions disclosed by Berkesse and Miyata are also quite different from that of the present invention, as discussed

below. See the attached Appendix for the reaction scheme of each of Berkessel et al and Miyata. Further, Berkesse and Miyata neither disclose or suggest that the catalyst disclosed by them could be used in the reaction disclosed by Yamakawa. A person with ordinary skill in the art would understand the difficulty in determining whether or not the same catalyst would be active in a different reaction without performing experiments. Indeed, the Examiner concedes this point on page 9, lines 5-8 of the Office Action, wherein it is stated that "The skilled organic chemist would not prescient analogous chemical behavior of rare earth and transuranium members. Indeed, organic synthesis is an unpredictable art, and without more information, it is difficult to imagine that actinides would be useful in the claimed processes".

The Examiner's position is thus improper hindsight insofar as the references cited include no teaching or suggestion to combine the catalyst used in the present invention with the reaction disclosed by Yamakawa.

Specifically, the reactions reported by Berkesse are a reaction between epoxides and alcohols to yield alkoxy alcohols, and a Baeyer-Villiger oxidation to yield lactones. Berkesse uses catalysts containing a lanthanoid element in its reactions. Since the reactions by Berkesse are different from the reaction of the present invention, Berkesse cannot be properly used in an obviousness rejection without some further rational basis from the Examiner as to why an ordinarily skilled artisan would have seen the present invention as obvious over the references.

Similarly, the reaction disclosed by Miyata is a reaction of epoxidizing a double bond of a fluorinated methacrylate. Miyata discloses that alkoxides of lanthanoid elements were used as a catalyst in this reaction. Since the reaction in Miyata is different from the reaction of the present invention, Miyata also cannot be properly used in an obviousness rejection without some



further rational basis from the Examiner as to why an ordinarily skilled artisan would have seen the present invention as obvious over the references.

Additionally, the Examiner states in paragraph 24(d) of the Office Action that the catalyst identity is not that particular for the alkoxy alcohol transformation, and that the more important factor governing the reaction is the presence of water. The Examiner is mistaken.

The present invention does not always require the presence of water. For instance, no water was added in Examples 2, 4, 6, 8, 10, 12, etc. of the present application. Water was added in Examples 23 and 26. Examples 23 and 26 show that the catalyst of the present invention exhibited a small reduction in reactivity in the presence of water. In Comparative Example 3, the reaction was carried out using an MgO catalyst in the presence of water. The yield of 3- MP per 1 mmol of metal per one hour is very low in Comparative Example 3, as shown in Table 1 on page 54 of the English text of the present application. It is also described on page 22, lines 8-29 of the English text of the present application, that the smaller amount of water is preferable in the reaction of the present invention.

Hence, the present invention would not have been obvious over Yamakawa or Miyata.

Further, the reaction reported by Chaudhari is a synthesis of 1,3-propanediol via hydroformylation of vinyl acetate and then hydrogenation and hydrolysis, which is different from the reaction of the present invention. The reaction scheme of Chaudhari is included in the attached Appendix. Chaudhari thus also cannot be properly used in an obviousness rejection without some further rational basis from the Examiner.

The present invention is characterized by a catalyst used in a reaction between allyl alcohol and an alcohol which is the first step of claim 1. Chaudhari does not disclose a reaction

between allyl alcohol and an alcohol. The only common point between Chaudhari and the present invention is that the final product is 1,3-propanediol.

In view of the foregoing, the present invention would not have been obvious over the references cited, alone or in combination.

Withdrawal of the rejections are earnestly solicited.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

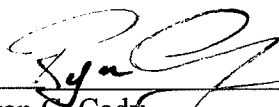
SUGHRUE MION, PLLC  
Telephone: (202) 293-7060  
Facsimile: (202) 293-7860

WASHINGTON OFFICE

**23373**

CUSTOMER NUMBER

Date: August 27, 2009

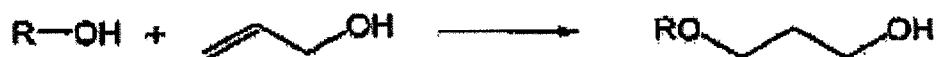
  
\_\_\_\_\_  
Ryan C. Cady  
Registration No. 56,762

# APPENDIX

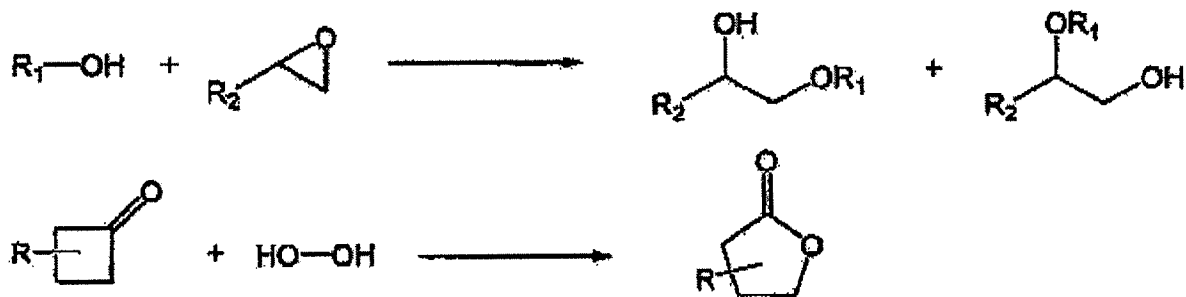
The Reaction of the Present Invention:



Yamakawa's Reaction:



Berkese's Reaction:



Miyata's Reaction"



Chaudhari's Reaction:

